

NOA Services and Infrastructure Related to Forecasting, Localization, Management and Mitigation of Natural Hazards

Prof. Manolis Plionis
Director of NOA
and President of the BoD



Yerevan, 9 December 2019



NOA Services and Infrastructure Related to Forecasting, Localization, Management and Mitigation of Climate Change – related Hazards

The National Observatory of Athens (NOA) was founded in 1842 on the hill of the Nymphs, across from the Parthenon, and is the oldest research institution in Greece.





NOA Services and Infrastructure Related to Forecasting, Localization, Management and Mitigation Natural Hazards

NOA currently consists of three institutes:

1. on **astronomy, astrophysics, space science applications and remote sensing,**
2. on **environmental research and sustainable development,** and
3. on **Geodynamics.**





NOA Services and Infrastructure Related to Forecasting, Localization, Management and Mitigation Natural Hazards

The NOA develops and offers specialized tools & innovative services related to Civil Protection

- NOA operates an extensive network of research facilities (**ground and space sensing stations**), supporting high quality basic & applied research, and develops **analytical and numerical models and information analysis algorithms** processing large volume of data in real time!
- Operates the National Seismological Network,
- Operates the National Tsunami Center
- Hosts the UNESCO Chair for Natural Hazards,
- Participates in numerous international networks.
- NOA hosts in 3 Postgraduate Programs (**Space, Environment, Natural Hazards**).





NOA Services and Infrastructure Related to Forecasting, Localization, Management and Mitigation Natural Hazards

Recipients of our services:

Public sector and organisations



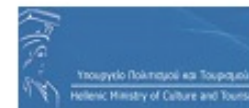
ΓΕΝΙΚΗ ΓΡΑΜΜΑΤΕΙΑ
ΠΟΛΙΤΙΚΗΣ ΠΡΟΣΤΑΣΙΑΣ



ΥΠΟΥΡΓΕΙΟ ΥΓΕΙΑΣ
&
ΚΟΙΝΩΝΙΚΗΣ ΑΛΛΗΛΕΓΥΗΣ



ΑΤΤΙΚΟ ΜΕΤΡΟ Α.Ε.



Υπουργείο Πολιτισμού και Τουρισμού
Hellenic Ministry of Culture and Tourism



ΟΡΓΑΝΙΣΜΟΣ
ΕΛΛΗΝΙΚΩΝ
ΓΕΩΡΓΙΚΩΝ
ΑΣΦΑΛΙΣΕΩΝ



ΠΕΡΙΦΕΡΕΙΑ
ΑΤΤΙΚΗΣ
ΑΘΗΝΑ



Εθνικό Κτηματολόγιο
& Χαρτογραφική Α.Ε.



ΔΗΜΟΣ ΑΘΗΝΑΙΩΝ

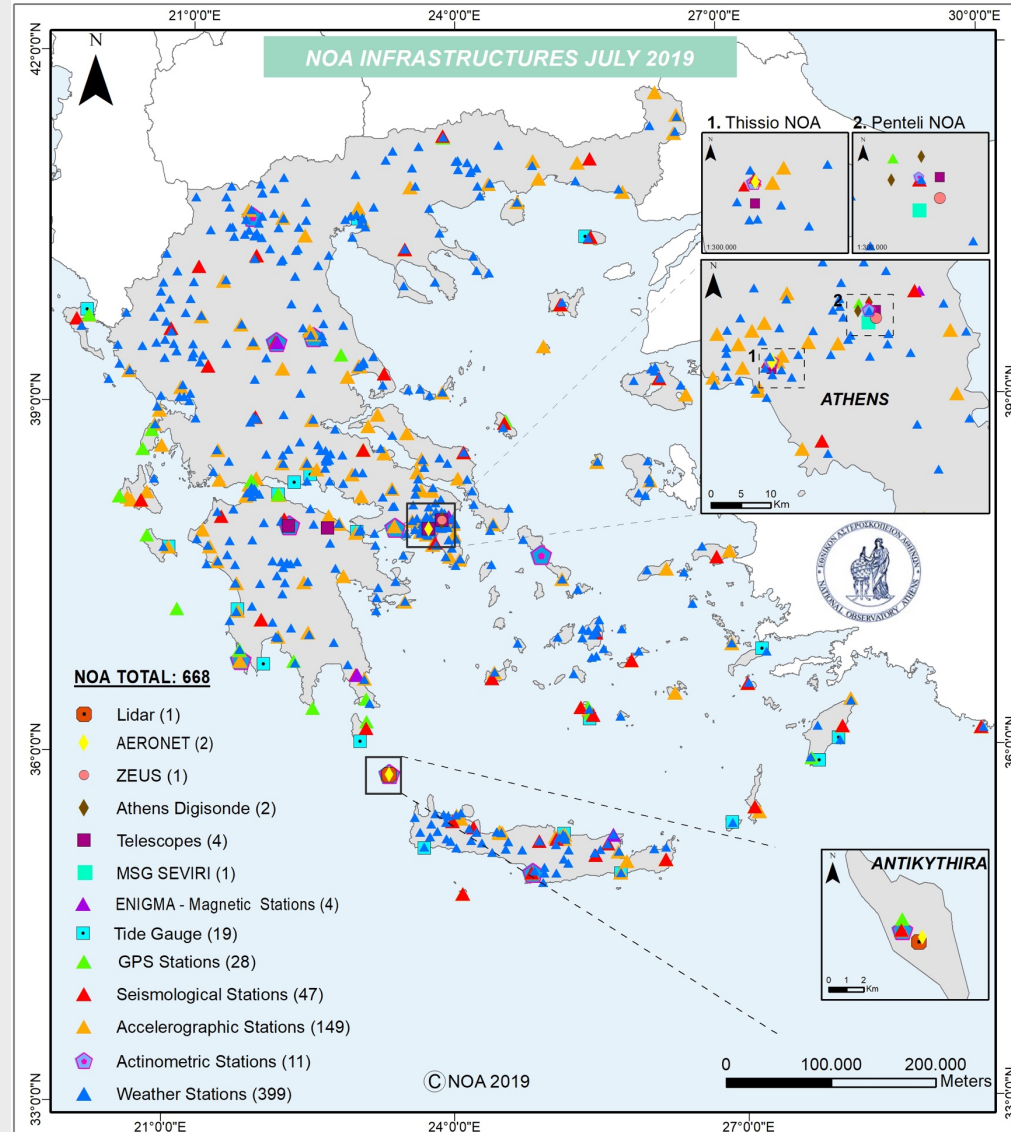


NOA Services and Infrastructure Related to Forecasting, Localization, Management and Mitigation Natural Hazards

Ground based Research Infrastructures

(more than 670 stations)

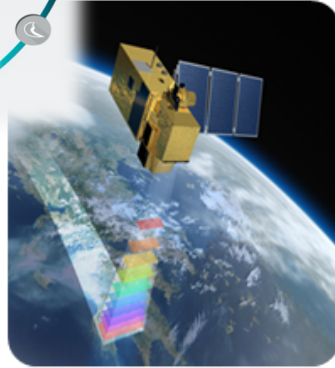
- 400 meteorological stations – on line database (METEO)
- 46 Seismographs
- 141 Strong Motion detectors (Accelerators)
- 24 GPS stations
- 8 Radon stations
- 16 Tide Gauges (National Tsunami Center- UNESCO)
- 8 Magnetometers
- 4 Telescopes
- 1 Ionospheric Station
- Radars
- Lidar (laser)
- Atmospheric Chemistry Laboratory (mobile)
- 2 UAV's



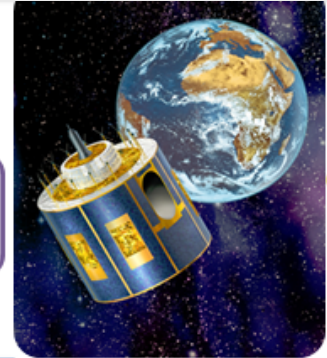
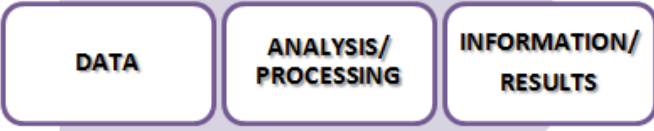
NOA Services and Infrastructure Related to Forecasting, Localization, Management and Mitigation Natural Hazards

Space based Research Infrastructures

Monitoring Systems



Satellites
Polar Orbit
X-/L-band
Station
Sentinel
Mirror Site



Satellites
Geostationary
Orbit
MSG Seviri



Aerial Vehicle
or Unmanned
Aerial Vehicle



in-situ



Terrestrial
Platforms and
Networks



SENTINEL-1

SENTINEL-2

SENTINEL-3

SENTINEL-4

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NOA Services and Infrastructure Related to Forecasting, Localization, Management and Mitigation Natural Hazards



BE  OND

COPERNICUS DATA HUB
Operations Center



- INTHUB #1
- COLHUB #3
- DIASHUB #3
- AfricaCastHub
- S-5p PreOps Hub
- S-5p Expert Users Hub
- TMPHUB #1
- HNSDMS

58 VMs
60 VMs
storage: 800 TiB,
680 CPU cores,
2.2 TiB RAM



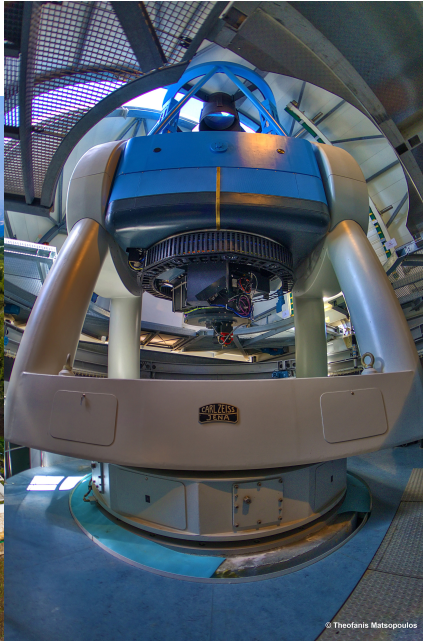
<http://sentinels.space.noa.gr>



Distributes 55 TB / Day
Operations 24/7/365
GEANT 500-700 Mbps

A 550 TB network filesystem for storing > 500 thousand Sentinel products at any time

NOA Services and Infrastructure Related to Forecasting, Localization, Management and Mitigation Natural Hazards



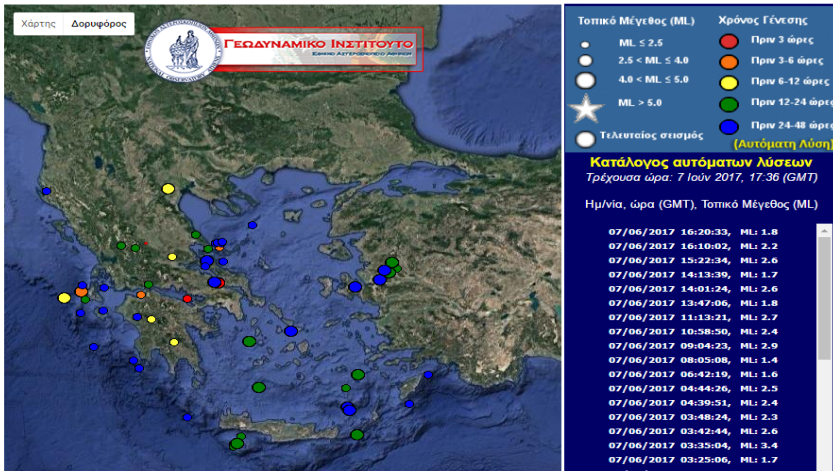


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Geodynamics Institute

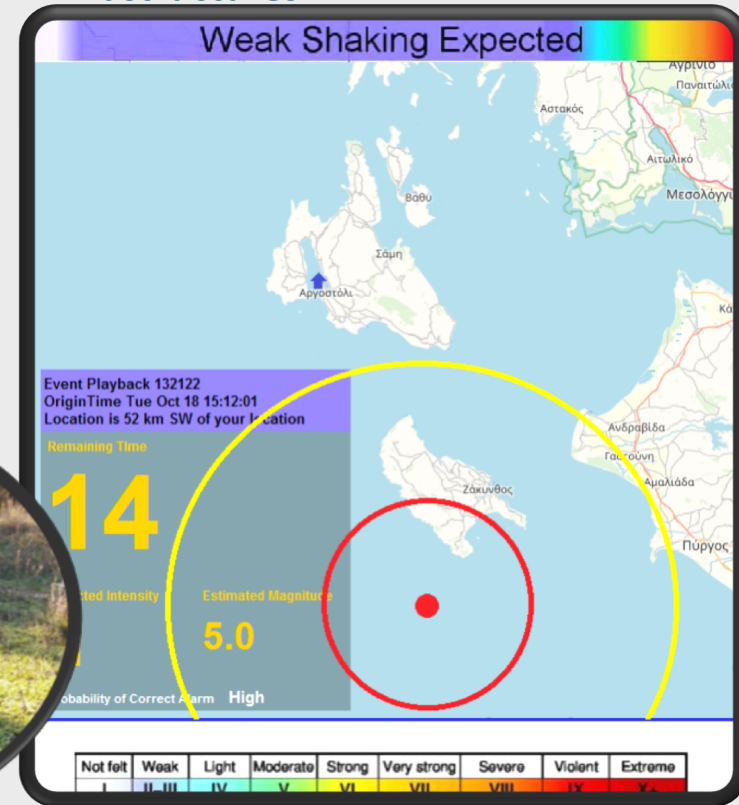
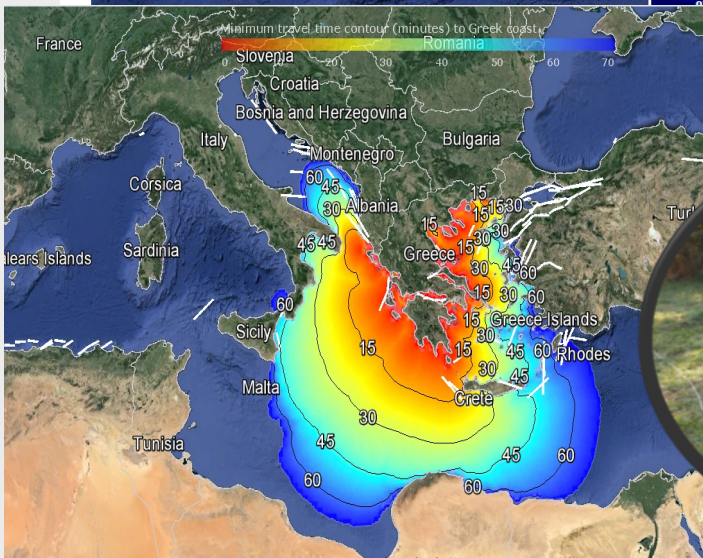
Operational monitoring of Seismicity, of Tsunami danger and of Geophysical disasters

Παρακολούθηση της σεισμικότητας σε πραγματικό χρόνο τις τελευταίες 48 ώρες (αυτόματες λύσεις)



ARIS, Early Warning System

Integrated Early Warning and Seismic Danger Management System, specially apt for Strategic Industrial Infrastructures.





METEO Services: Weather Monitoring, Forecasting (24/7) & weather related natural hazards

PI: **Dr. V. Kotroni & Dr. K. Lagouvardos**

Network of 400 automatic meteorological stations, the largest in Greece

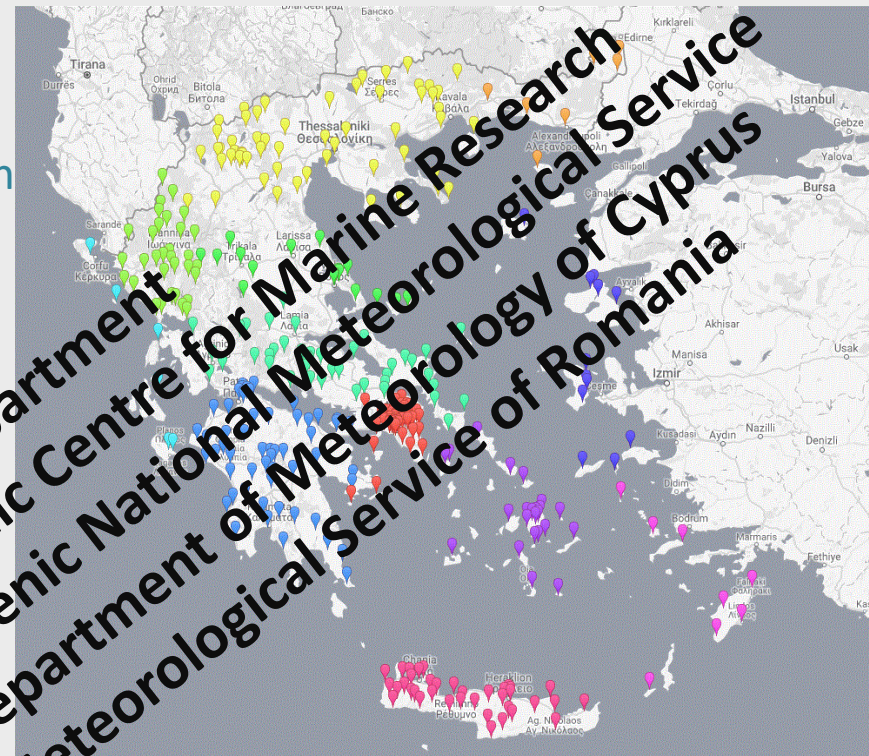
NOA produces **tailor-made weather forecasts** with an emphasis **on severe events**

- **Weather** Forecasts and related alerts
- **Lightning** & Storm Forecasts
- **Wave** Forecasts
- **UV** radiation forecasts
- **Nowcasts** based on model and satellite data
- **Dust** Forecasts (provided operationally to the **WMO** initiative SDS-WAS)

NOA is among the very few Centers that operates measurement networks outside Greece: **VLF lightning detection network ZEUS** with sensors in Spain, UK, Denmark, Rumania, Cyprus, Egypt

www.meteo.gr

- Visited by **>350.000** users daily
- Listed **1st** in terms of visits among the **public sector sites**
- Listed among the **top 10** in terms of average daily visitors among the **Greek sites**.



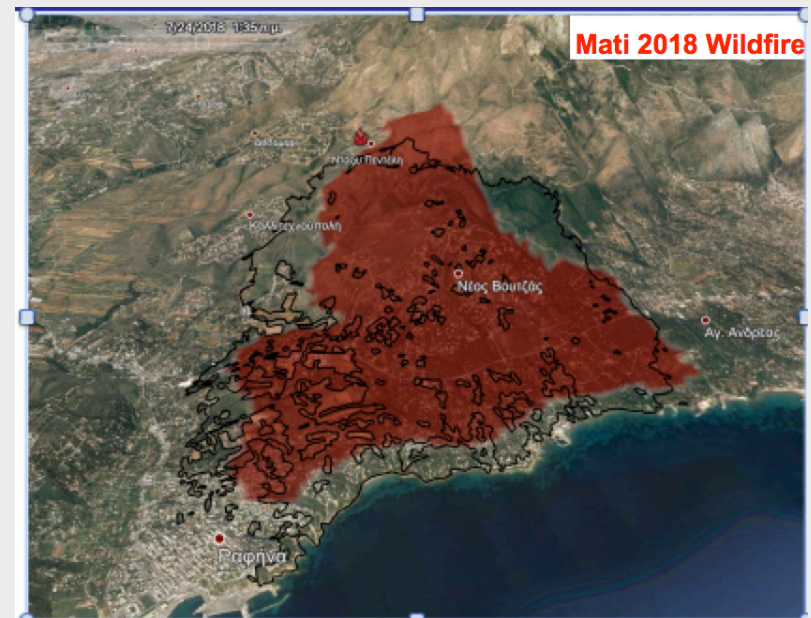
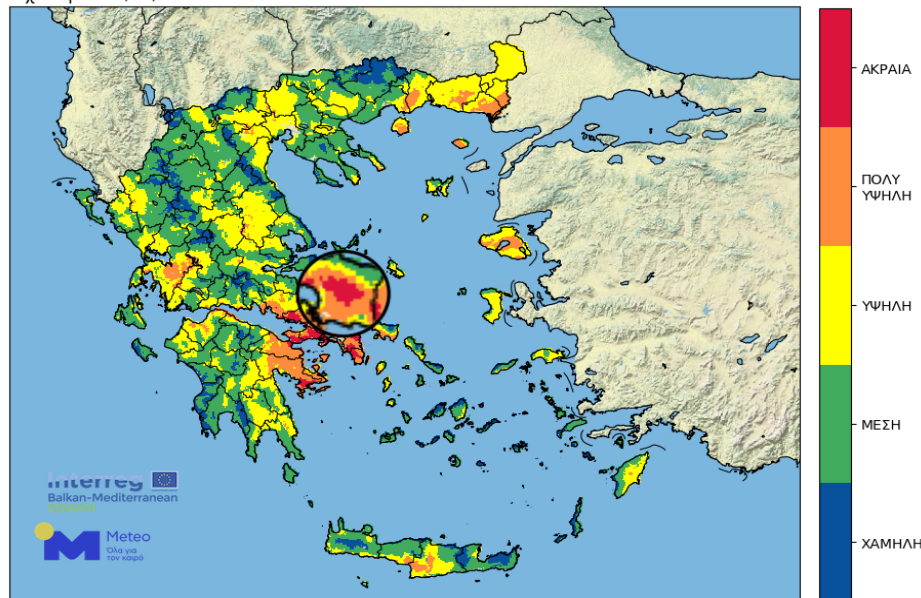


IRIS: Real-Time Rapid-response Forest Fire Spread Forecasting

Essentials:

- real-time monitoring of surface meteorological conditions, especially during events of rapid fire spread
- Detailed topography, the fuel type and density
- Ignition location.
- Interaction of fire and weather, and feeding loop that takes into account the local effect of the fire on weather

HERMES/WRF V2.0: Ελλάδα - 2km
Σύνθετος δείκτης επικινδυνότητας πυρκαγιάς - DISARM
Ισχύει για: 13/08/2019



Within 15 min (1 h) from activation a 6-h (24-h) forecast of the fire spread is provided.

Fire danger forecasts
(for the next 3-5 days)

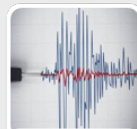
BEYOND: EO Based An EU Center for DRR



Floods



Land-slides



Earthquakes-Erosion



Fires



Extreme Weather



Volcanoes



Toxic Emissions



Tsunami

Tasks

Real Time
Monitoring of
Natural Disasters

Area of Interest:

SE Europe,
Mediterranean,
N. Africa, M. East,
Balkans

Tasks

Risk & Damage
Assessment and
Mitigation Measures

Area of Interest:

Global Level

www.beyond-eocenter.eu



FIREHUB: A SPACE BASED HUB OF FIRE MANAGEMENT SERVICES



The Earth Monitoring Competition

**Copernicus
masters**

WINNER
BEST SERVICE CHALLENGE
2014

10:00 AM

12:00 AM

4:00 AM

BE  OND
FireHub



**Migration of the
FireHub Service to
Space Agency in
Mexico**



<http://ocean.space.noa.gr/FireHub>

BEYOND EO CENTER SERVES COPERNICUS EMS: EUROPEAN FOREST FIRE INFORMATION SYSTEM (EFFIS)

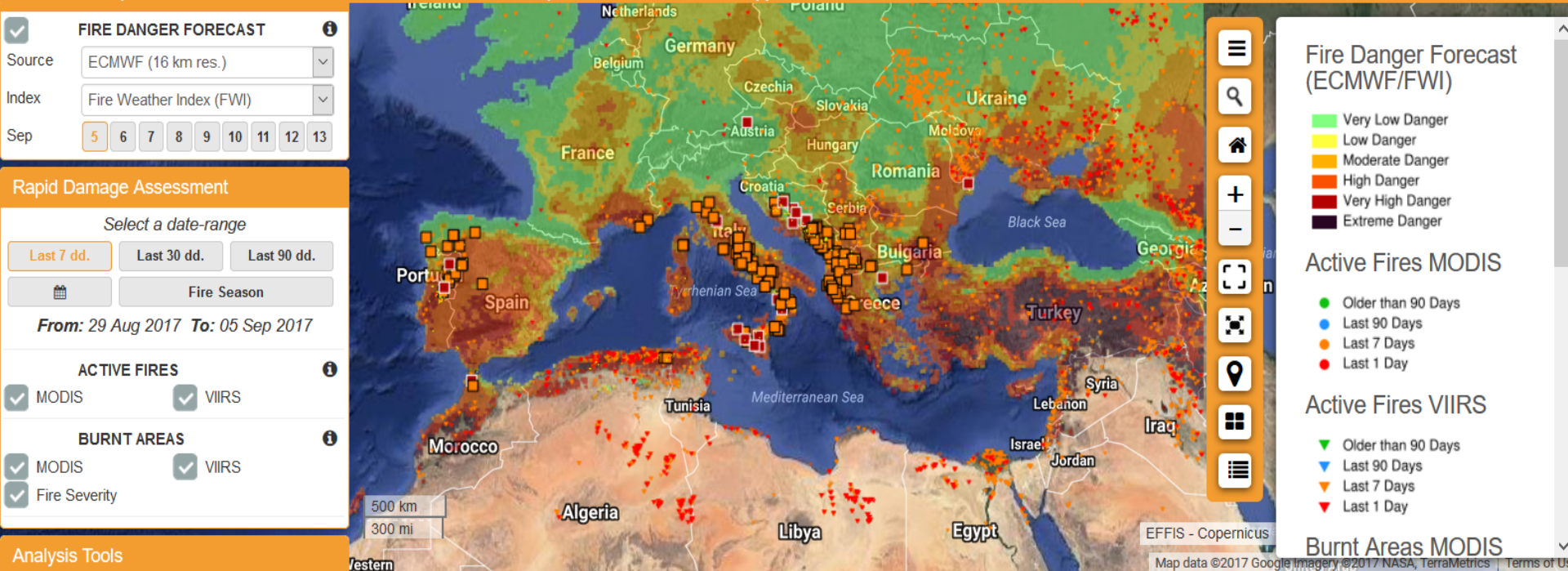


COPERNICUS

Emergency Management Service



European Commission > JRC EU Science Hub > DRM > Copernicus EMS > EFFIS > Applications > Current Situation Viewer



DAILY ACTIVE FIRES & BURNED AREA MAPPING OVER EUROPE, N. AFRICA, M. EAST, BALKANS

BEYOND EO CENTER SERVES COPERNICUS EMS: PREVENTION - PREPAREDNESS - RISK ASSESSMENT - RESPONSE - MITIGATION

Preparedness, Vulnerability and Risk Assessment, Recovery, and Mitigation Planning Services have been delivered to > 20 Civil Protection Authorities worldwide

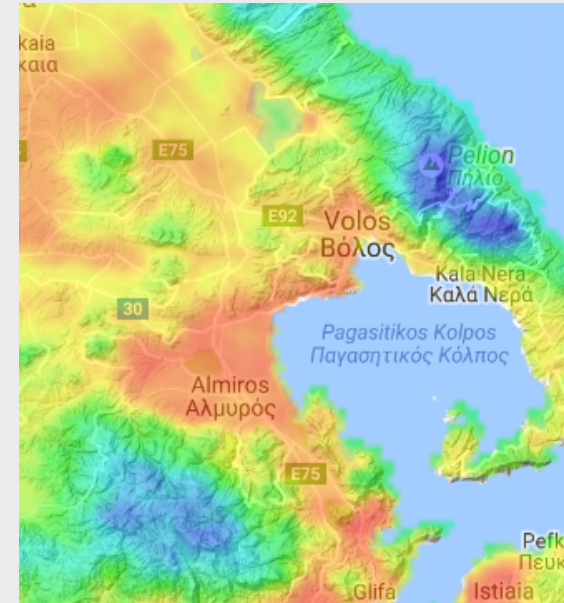
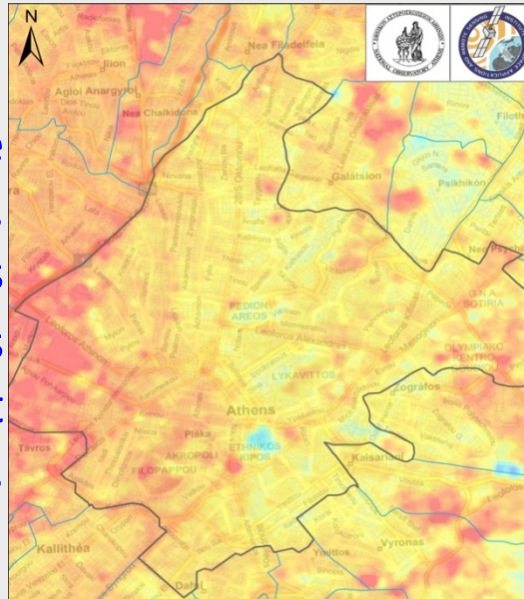




Emergency notification system for extreme temperatures

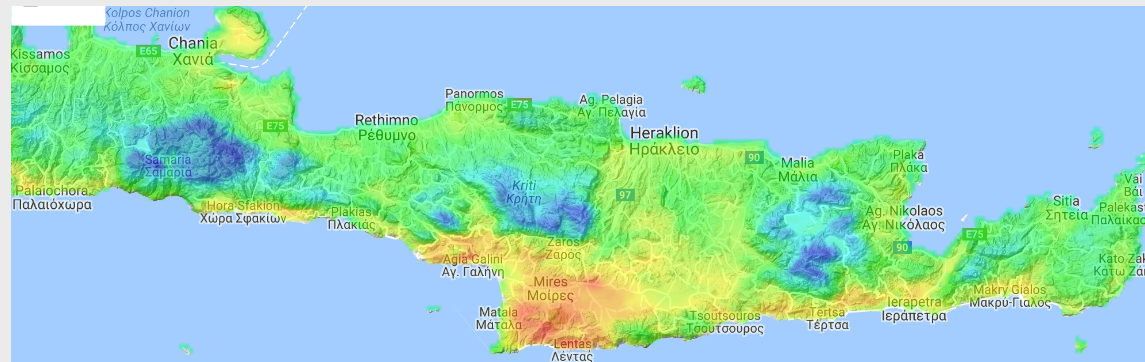


The city center is warmer than the peri-urban and rural areas. The phenomenon is also known as **Urban Heat Island** and affects the intensity and duration of heat waves.



Heat waves are expected to be

- More often
- More intense
- Longer





Emergency notification system for extreme temperatures



A tool that can spot-out in real time the city areas that suffer most during the ongoing event, indicating where victims are to be expected.

EXTREMA uses real-time satellite data, along with other model and city-specific data to estimate the **temperature, humidity, and discomfort index** for every square kilometer in the city.

Temperature estimates are updated every 5 minutes, providing data at a spatial and temporal resolution that is not available from any other service.

1 Δήμος



Dashboard

- Ειδοποιήσεις
- Δροσερά Μέρη

- Χάρτες από δορυφορικά δεδομένα σε πραγματικό χρόνο



2 Πολίτες



Εφαρμογή για Κινητά Τηλέφωνα

- Εξατομικευμένες Εκτιμήσεις Κινδύνου

- Συμβουλές
- Πλησιέστερα Δροσερά Μέρη

2018

Athens, Paris,
Rotterdam

Majorca

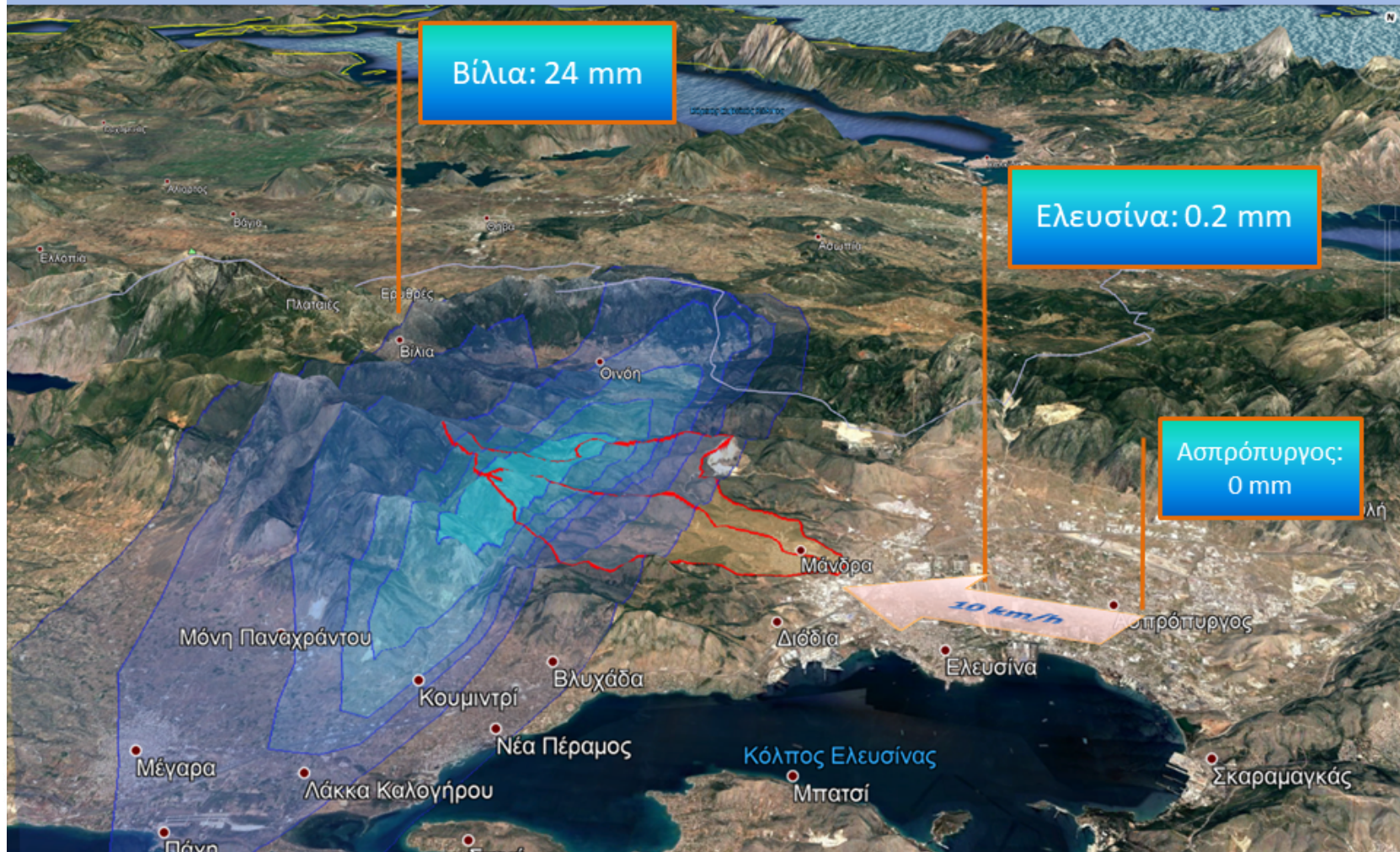
2019

Lisbon, Milano



Contribution of NOA to the deciphering of the Mandra Flash Flood: 15 November 2017

15 Νοεμβρίου 2017: Οι βροχές στη Μάνδρα (ραντάρ & σταθμοί)

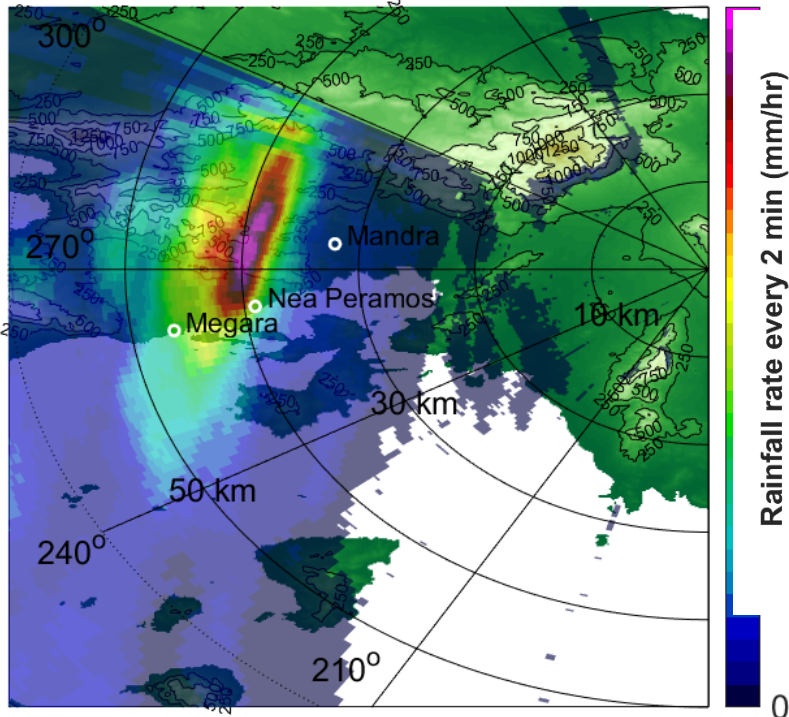




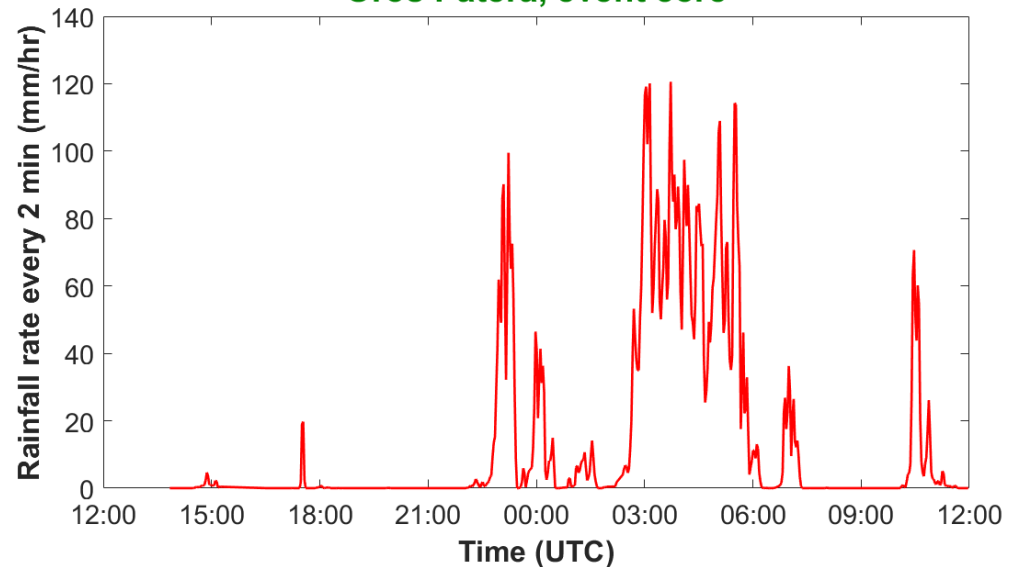
Contribution of NOA to the deciphering of the Mandra Flash Flood: 15 November 2017

Within a few hours (3:00-6:00 UTC) a huge amount of rain was delivered (50-80 mm/hr) with maxima 120 mm/hr (using our X-band 3.2cm dual Polarization Doppler radar).

NOA-XPol accumulated rainfall (mm)



Oros Patera, event core



Time-series of the precipitation rate (2 min resolution).

14-Nov-2017 13:49 to 15-Nov-2017 12:00 UTC





NOA Services and Infrastructure Related to Forecasting, Localization, Management and Mitigation Natural Hazards

Many extreme weather events and natural disasters are related to **Climate Change**





A New Strategic Development in NOA

PANGEA: The Observatory of Geosciences and Climate Change

Unique for Greece, Prototype superstation with immediate targets:

(α) the constant monitoring of climate and atmospheric parameters, greenhouse gases and their evolution

(β) to contribute to the fulfillment of our National obligations according to:

- ✓ The Paris agreement on Climate,
- ✓ The 4th Assessment of the Intergovernmental Committee for Climate Change
- ✓ The EC thematic strategy on air pollution





Thank you

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